# Taxonomic studies on the Gelidiaceae (Rhodophyta) in Cheju Island I. Some members of Gelidium* 

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#### Abstract

A preliminary work was made on some members of Gelidium from Cheju Island. Morphotaxonomic characteristics were investigated with the taxa, G. amansii, G. sesquipedale, G. comeum var. pinnatum, G. divaricatum, G. pusillum, and G. vagum. The morphology of thallus, tetrasporic or cystocarpic ramuli, and cortical cells, the outlines of main axes represented by cross section, and the distribution of rhizoidal filaments were employed for classification of the taxa. The morphology of tetrasporic or cystocarpic ramuli and the outlines of main axes represented by cross section were appeared to be rather useful for delineation of the taxa. It still needs further investigation to find diagnostic characters for specific and generic circumscription of the Gelidiaceae in Korea.


## Introduction

Gelidioid algae occur in the wide range of tidal and subtidal zone all the year round in Cheju Island. The plants are composed of prostrate and erect filaments. The prostrate filaments are generally less expanded than the erect filaments, usually terete, contorted, with a role of fixig the erect filaments to substratum. In some taxa, short and wart-like attaching apparatuses are issued from erect or prostrate filaments (e.g., G. divaricatum, G. pusillum). The erect filaments of gelidioid algae are various in morphology such as simple or branching, terete to depressed linear or foliaceous. Fine rhizoidal filaments develop between medullary cells, linear with thick wall, and run generally along the growing axis. The rhizoidal filaments of G. divaricatum run in longitudinally

[^0]interlacing mode along the growing axis.
Ultimate branchlets are generally transformed into tetrasporic or cystocarpic ramuli. The tetrasporic ramuli are rather depressed and pale in color, in which tetrasporangia are distributed. The cystocarps are also born on terminal to middle parts of the ultimate branchlets and mature in a biconvexed form with one or two pores on each side.

Gelidioid algae are known to be various in morphology depending on habitats, seasons or sexualities (cf. Dixon and Irvine 1977). Weber van Bosse (1921) attached taxonomic importance to the arrangement of cortical cells in surface view of gelidioid algae. Akatsuka (1970) advocated that the morphology of cortical cells could be an effective criterion for classification of Gelidium. Generally, the distribution of rhizoidal filaments and thallus morphology have been employed for specific circumscription of Gelidium (e.g., Newton 1931, Okamura 1936, Dawson 1944, Taylor 1945, Segi 1957, Abbott and Hollenberg 1967, Dixon and Irvine 1977, Sohn and Kang 1978, etc.). Stewart and Norris (1981) confirmed the variation of the rhizoidal filament distribution by observation of serial sections of an erect filament. Rhizoidal filaments of depressed erect filaments appeared in end-view to be more congested at the marginal part than at the central part. The shape and arrangement of fructiferous ramuli was also regarded as a useful criterion for classification (e.g., Segi 1957, Gardner 1927, etc.). However, no diagnostic character has been known for delineation of Gelidium taxa to date. Therefore, it is difficult to discern cystocarpic, tetrasporic, male gametangial, and sterile plants in a single taxon. Sohn and Kang (1978) indicated that it would be better to employ all the characters mentioned above for classification of Gelidium.

This is the preliminary wark on the taxonomy of the Gelidiaceae in Korea. Therefore, only some of the members of Gelidium occurring in Cheju Island are treated in this paper. I am grateful to Professor Dr. In Kyu Lee, Department of Botany, Seoul National University, for his kind advice. Thanks are due to Dr. Hae Bok Lee, Department of Biology, Chongju University, for critical reading this manuscript.

## Materials and Methods

The plants were collected in the intertidal and subtidal zone by skin SCUBA diving during the period from March 1987 to January 1988. The collected material was fixed with formalin-seawater ( $10 \%$ ) and transported to the Laboratory. Some representative plants of a taxon were selected for dried specimens. The erect filaments and fructiferous branchlets were taken for microscopic observation. The cross section of the upper, middle, and lower parts of main axes were obtained with the freezing microtome (MFS $222+250$ ) in order to get hold the outlines of main axes and to observe the rhizoidal filament distribution and cortical or medullary cell morphology. Occasionally, the longitudinal section of the middle part of main axes was obtained for side-view of the internal structure. Karo ( $30 \%$ +few drops of formalin) solution was used for mounting the slide preparation.

## Description of Taxa

Gelidium amansii Lamouroux (1813, p. 41)
Text Figs. 1-12.
Korean name:우뭇가사리
Plants are tufted with many branches, $8-10 \mathrm{~cm}$ high (Figs. 1, 2). Prostrate filaments are terete, contorted and issuing branches. Erect filaments are linear, slightly depressed at middle part with a composite of short and long branches subdistichously. The outlines of erect filaments represented by cross section are; ellipsoid along the whole length of erect filaments, $450-600 \mu \mathrm{~m}$ thick and $900-1100 \mu \mathrm{~m}$ wide (Figs. 6, 7, 8). Occasionally, the middle part of erect filaments in cross section is rather depressed and showing linear in shape, $200-220 \mu \mathrm{~m}$ thick and $1200-1400 \mu \mathrm{~m}$ wide (Figs. 9, 10). Cortical cells are globose to subglobose. The inner cortical cells, are ellipsoid and elongating parallelly to surface in end-view (Fig. 11). Medullary cells are fusiform with slender cellcontents (Fig. 12). Rhizoidal filaments are $5-8 \mu \mathrm{~m}$ thick, congested in the outer medullary layers and somewhat loosely scattered in the center of medulla (Fig. 11).

Tetrasporic ramuli are born on the short branchlets of the lower part of erect filaments and become lanceolate with a short stalk. Cystocarps are formed on the terminal or middle part of the ultimate ramuli developed from the short branchlets of the lower part of erect filaments.

Collections examined: LYP 491, Hengwon, Cheju, 1987-III-18 (leg. K.J. Lee). LYP 530, Bomokri, Cheju, 1987-II-14 (leg. K.J. Lee). LYP 539, Bukchon, Cheju, 1987-XII-21.
G. amansii has been known as a polymorphic taxon (cf. Okamura 1934), Thus, Okamura (1934) divided this taxon into four forms; G. amansii f. typica, f. elegans, f. elatum and f. teretiusculum, mainly based on the morphology of erect filaments. The plants from Cheju Island agree quite well with the illustrations and descriptions of G. amansii f. typica given by Okamura (1934) in the thallus morphology and the shape and arrangement of tetrasporic ramuli. No authentic illustration of $G$.


Fig. 1. Gelidium amansii. A tetrasporic plant. scale unit: mm .


Flg. 2. Gelidium amansii. A cystocarpic plant. scale unit: mm .


Fig. 3-12. Galidium amansii. Fig. 3. A branchlet bearing cystocarpic ramuli. scale bar: 1mm. Figs. 4,5. Branchlets bearing tetrasporic ramuli. scale bars: 1 mm . Figs. $6,7,8,9,10$. Outlines of erect filaments represented by cross section of upper, middle, lower, middle and middle parts respectively. scale bars: 300um. Figs. 11,12. Internal structures of erect filaments represented by cross and longitudinal section respectively. scale bars: 50 um .
amansii given by Lamouroux could be consulted during this study. It will be interesting to observe the polymorphism according to environmental factors or sexualities.
G. amansii was first described as Fucus amansii by Lamouroux in his dissertation(1804). Later, he has established a genus Gelidium including this taxon. Therefore, some authors treated this taxon under the name, G. amansii (Lamouroux) Lamouroux (e.g., Lee and Kang 1986).

Gelidium sesquipedale (Turner) Thuret (in Bornet and Thuret 1876, p. 61) Text Figs. 13-29. Basionyms:Fucus corneus var. sesquipedalis Clemente 1807; p. 31.

Fucus sesquipedalis Turner 1808-1819; tab. 257, fig. f.
Korean name:가시 우뭇가사리 (신칭)
Plants occur solitarily and are somewhat rigid, $7-10 \mathrm{~cm}$ high (Figs. 13, 14). Erect filaments are broadly depressed and doubleedged (anticipito-compressed) at the lower part (Figs. 18, 24). The long branches are few and issued at various intervals. The ultimate branchlets are distichous in arrangement and dentate in shape. Outlines of erect filaments represented by cross section are ; longish ellipsoid, $240-320 \mu \mathrm{~m}$ thick and $1100-1300 \mu \mathrm{~m}$ wide at the upper part (Figs. 15, 23), linear, $190-380 \mu \mathrm{~m}$ thick and $1800-2200 \mu \mathrm{~m}$ wide at the middle part (Figs. 17, 25), fusiform, doubleedged, $540-560 \mu \mathrm{~m}$ thick and $1300-2400 \mu \mathrm{~m}$ wide at the lower part of erect filaments (Figs. 18, 24). Cortical cells of erect filaments in cross section are ellipsoid and anticlinally clongating to surface at the upper part (Figs. 16, 28), small and globose at the middle part (Figs. 19, 26), ellipsoid and parallelly elongating to surface at the lower part of erect filaments (Figs. 20, 29). The cortical cells in


Fig. 13. Gelidium subcostatum. A sterile plant. scale unit: mm .


Fig. 14. Gelidium subcostatum. A cystocarpic plant. scale unit: mm.


Fig. 15-21. Gelidium sesquipedale. Sterile plants. Fig. 15,17,18. Outlines of erect filaments represented by cross section of upper, middle and lower parts respectively. scale bars: 300 um . Fig. 16,19,20. Internal structures of erect filaments represented by cross section of upper, middle and lower parts respectively. scale bars: 50um. Fig. 21. A longitudinal section of the middle part of erect filaments. scale bar: 50um.


Fig. 22-29. Gelidium sesqquipedale. Cystocarpic plants. Fig. 22. A branchlet bearing cystocarpic ramuli. scale bar: 1 mm . Figs. $23,24,25$. Outlines of erect filaments represented by cross section of upper, lower and middle parts respectively. scale bars: 300 um . Figs. $26,28,29$. Internal structures of erect filaments represented by cross section of middle, upper and lower parts respectively. scale bars of 26 and 29.50 um , scale bar of $28: 20 \mathrm{um}$. Fig. 27. A longtudinal section of erect filaments. scale bar: 50 um .
longitudinal section are also globose to ellipsoid (Figs. 21, 27). Rhizoidal filaments are congested in the outer medullary layers of the upper part, but in the whole medulla of the middle to lower part of erect filaments (Figs. 16, 19, 20, 26, 28, 29).

Cystocarpic plants are smaller and more branched than sterile ones (Figs. 13, 14). Cystocarps are born subterminally on ultimate branchlets of the upper part of erect filaments.

Collections examined:LYP 531, Bomokri, Cheju, 1987-II-14 (leg. K.J. Lee). LYP 497, Hengwon, Cheju, 1987-V-12 (leg. K.J. Lee).

The plants of Cheju Island agree well with the illustration and description given by Gayral (1966) except the thallus height. The plants of Cheju Island are also related to Gelidium subcostatum Okamura in having a midrib on erect filaments. However, the latter taxon has big cells in the outer medullary layers. Kylin (1956) established a new genus, Berkerella, in the Gelidiaceae on the basis of the distinct midrib on the lower part of erect filaments and merged G. subcostatum in this genus. Santelices and Stewart (1985) characterized the genus, Berkerella, as having big cells in the outer medulla. It needs more accumulation of information on the relationship between Gelidium and Berkerella.

Gelidium corneum (Hudson) Lamouroux var. pinnatum Kuetzing (1849, p. 764)
Text Figs. 30-38.
Korean name: 깃우뭇가사리 (신칭)
Plants are more or less tufted, 5-7 cm high (Fig. 30). Erect filaments are terete and slender at the


Fig. 30. Gelidium corneum var. pinnatum. A tetrasporic plant. scale unit: mm.


Fig. 31-38. Gelidium corneum var. pinnatum. Figs. $31,32,33,35$. Outlines of erect filaments represented by cross section of middle, upper, lower and lower parts respectively. scale bars: 250 um . Fig. 34. A branchlet bearing tetrasporic ramuli. scale bar: 1 mm . Figs. $36,37,38$. Internal structures of erect filaments represented by cross section of upper, lower and middle parts respectively. scale bars: 50 um .
lower part, broadly depressed at the middle part, and gradually attenuating toward the apex. Branches are issued secundly, distichously or irregularly from the edges of erect filaments. Particullarly, the ultimate branchlets are arranged pinnately on the same plane. The apices of erect filaments and branchlets are depressedly inflated and retuse (Fig. 34). Outlines of erect filaments represented by cross section are ; circular to ellipsoid, ca. $500 \mu \mathrm{~m}$ thick and ca. $800 \mu \mathrm{~m}$ wide at the upper part (Fig. 32), longish ellipsoid, ca. $400 \mu \mathrm{~m}$ thick and ca. $1500 \mu \mathrm{~m}$ wide at the middle part (Fig. 31), circular to orbicular, $600-650 \mu \mathrm{~m}$ in diameter at the lower part of erect filaments (Figs. 33, 35). Cortical cells of erect filaments in cross section are ellipsoid and anticlinally elongating to surface at the middle to lower part of erect filaments (Figs. 37, 38). Medullary cells have a thin wall. Rhizoidal filaments are $6-7 \mu$ m thick and congested in outer medullary layers and scant in the center of medulla.

Tetrasporangial sori occur in the terminal to middle part of ultimate branchlets. The tetrasporic ramuli are clavate in shape (Fig. 34). Cystocarpic plants are not observed in Cheju Island.

Collections examined : LYP 511, Hengwon, Cheju, 1987-XI-6 (leg. K.J. Lee).

The plants of Cheju Island agree quite well with the descriptions and illustrations given by Kuetzing 1849, 1868) in branching mode and thallus morphology. The plants of $G$. corneum var. pinnatum from Cheju Island are characterized by patently pinnate branchlets on the terminal region of erect filaments, retuse branchlets, and medullary cells with a thin wall. The thallus morphology is rather related to the plants of Pterocladia robusta Taylor (1945) in clavate and retuse branchlets. However, the rhizoidal filaments of the plants at hand are congested in the outer medullary layers and poorly scattered in the center of medulla. Bornet and Thuret (1876) regarded G. corneum var. pinnatum (sensu Kuetzing) as Pterocladia capilacea (Gmelin) Bornet on the basis of the single cystocarpic loculus. However, the thallus of the latter taxon had rhizoidal filaments in the central part of medulla. I prefer to regard the plants from Cheju Island in Gelidium on the basis of rhizoidal filament distribution pending that cystocarpic plants are found.

Gelidium divaricatum Martens (1866, p. 30, t. 8)
Text Figs. 39-44.
Korean name : 애기우뭇가사리
Plants are caespitose, forming a thin mat on rocks, less than 10 mm high. Erect filaments are terete or slightly depressed, contorted or decumbent, branching subdistichously and patently, and issuing wart-like attaching apparatuses here and there (Figs. 39, 40, 42). The erect filaments and branches attach to each other or substratum with the attaching apparatuses. Outlines of erect filaments represented by cross section is somewhat ellipsoid, $600-700 \mu \mathrm{~m}$ thick and $1100-1200 \mu \mathrm{~m}$ wide(Fig. 41). Outermost cortical cells are ellipsoid and anticlinally elongated to surface. Inner ones are globose in a cross section, but ellipsoid and anticlinally elongate to surface in a longitudinal


Fig. 39-44. Gelidium divaricatum. Figs. 39,40,42. Tetrasporic plants. scale bars: 1 mm . Fig. 41. A cross section of erect filaments. scale bar: 50 um . Fig. 43. A cross section of terrasporic ramuli. scale bar: 50 um . Fig. 44. A longitudinal section of erect filaments. scale bar: 50 um .
section (Figs. 41, 44). Medullary cells are terete and larger at the center than the outer part of medulla. Rhizoidal filaments are $4-5 \mu \mathrm{~m}$ thick and interlace between medullary cells (Figs. 41, 44).
Tetrasporic ramuli are formed by transformation of ultimate branchlets, more or less flattened, and brighter in color than the other part of a thallus.

Collections examined : LYP 473, Daepori, Cheju, 1986-Vl-8. LYP 486, Onpyong, Cheju, 1987XII -6.

The plants of $G$. divaricatum are growing on rocks forming a broad mat in the upper tidal zone in Cheju Island. Occasionally, Caulacanthus okamurae Yamada associates with this species.

Gelidium divaricatum is distinct from other gelidioid algae in Cheju Island in the development of rhizoidal filaments, which are interlaced between medullary cells. The interlacing rhizoidal filaments also appeared in the plants of G. microphysa Setchell et Gardner (Sohn and Kang 1978). The dwarf habit of G. divaricatum is related to G. pusillum. However, the latter taxon has foliaceous erect filaments and rhizoidal filaments running parallelly to growing axes.

Gelidium pusillum (Stackhouse) Le Jolis (1863; p. 139)
Text Figs. 45-52.
Synonym : Fucus pusillus Stackhouse 1795, p. 16, Tab. V.
Korean name: 실우뭇가사리
Plants are small, caespitose, composed of prostrate and erect filaments, 6-12 mm high. The prostrate filaments are as much expanded as erect filaments, contorted, terete and issuing erect or prostrate filaments on one side and attaching apparatuses on the other side. Occasionally, a part of the prostrate filaments is also depressed and broadened (Fig. 45). The erect filaments are abruptly broadened (to 1 mm wide) at the base showing a longish ellipsoid foliaceous form, also simple or issuing foliaceous to spine-like laterals (Fig. 48). Outlines of erect filaments represented by cross section are linear, slightly arcuate, ca. $80 \mu \mathrm{~m}$ thick and to 1 mm wide (Fig. 47). In cross section the cortical part of erect filaments are composed of $3-4$ cell layers. The outermost cortical cells are ellipsoid, anticlinally elongating to surface and inner ones are globose to subglobose in both end-and side-view (Figs. 49, 50, 51). The medulla of the foliaceous erect filaments are composed of 1-2 cell layers. Rhizoidal filaments are scantly distributed between medullary cells.

Tetrasporangial sori occur in the upper to middle part of foliaceous erect filaments (Fig. 46). Tetrasporangia are immersed beneath the cortical layers (Fig. 52).

Collections examination : LYP 474, Daepori, Cheju, 1986-Vl-8.
LYP 485, Onpyong, Cheju, 1987-XII-6. LYP 518, Onpyong, Cheju, 1987-XII-6.

The plants of G. pusillum occur associated with Caulacanthus okamurae Yamada or Gigartina


Fig. 45-52. Gelidium pusillum. Figs. 45,48. Tetrasporic and sterile plants respectively. scale bars: 1 mm . Fig. 46. Foliaceous erect filaments bearing tetrasporangial sori. scale bar: 1 mm . Fig. 47. Aan outline of foliaceous erect filaments represented by corss section. scale bar: 100 um . Figs. 49,50. Cross sections of erect filaments. scale bars: 20um. Fig. 51. A longitudinal section of erect filaments. scale bar: 20um. Fig. 52. A cross section of a part bearing tetrasporangial sori. scale bar: 50 um .
intermedia Suringar on sheltered rocks or crevices in the intertidal zone in Cheju Island. The plants at hand show an affinity with forma of the species, G. pusillum f. foliaceum Okamura (1934) in thallus morphology. However, Dixon and Irvine (1977) indicated that the plants of G. pusillum became leafy when growth slow down or stops from March to November and cylindrical during active growth from December to February in British Isles. Thus, they merged several related taxa into $G$. pusillum (e.g., G. crinale and G. pulchellum). It will be very interesting to investigate the seasonal variation of thallus form.

Gelidium vagum Okamura (1934; p. 58)
Text Figs. 53-63.
Korcan name: 막우뭇가사리
Plants are growing solitarily associated with other gelidioid algae, $70-80 \mathrm{~mm}$ high (Figs. 53, 54). Erect filaments are broadly depressed and strongly tapering toward apices showing terete linear filaments at terminal parts. Branches occur distichoalternately from the margin of main axes at intervals. Ultimate branchlets are short and spine-like in shape and occasionally transforming into tetrasporic ramuli. The outlines of erect filaments represented by cross section are ; terete, $500-800$ $\mu \mathrm{m}$ in diameter at upper part (Fig. 58), longish ellipsoid to fusiform, $350-400 \mu \mathrm{~m}$ thick and $2000-2600 \mu \mathrm{~m}$ wide at middle part (Fig. 59), terete, $500-600 \mu \mathrm{~m}$ in diameter at lower part of erect filaments (Fig. 60). The cortex of erect filaments is composed of 3-4 cell-layers. The outermost cortical cells in cross section are globose to oblong. Inner ones are ; globose at upper part (Fig. 57), ellipsoid and parallelly elongating to surface at middle part (Fig. 62), irregular in shape at lower part of erect filaments (Fig. 61). Rhizoidal filaments are densely congested in the outer medulla at the



Fig. 53. Gelidium vagum. A tetrasporic plant. scale unit: mm .
Fig. 54. Gelidium vagum. A tetrasporic plant. scale unit: mm.


Fig. 55-63. Gelidium vagum. Figs. 55,56 . branchlets bearing tetrasporic ramuli. scale bars: 1 mm . Figs. $57,61,62$. Internal structures of erect filaments represented by cross section of upper, lower and middle parts respectively. scale bars: 50 um . Figs. $58,59,60$. utlines of erect filaments represented by cross section of upper, middle and lower parts respectively, scale bars: 250 um . Fig. 63. A longitudinal section of erect filaments. scale bar: 50 um.
upper part and in the whole medulla at the middle to lower part of erect filaments. The medullary cell contents are rather flattened or linear in the thick cell wall at the upper and the lower part of erect filaments. The cell contents at the middle of erect filaments are finely linear.

Tetrasporic ramuli are born on terninal part of distichouse branches and main axes, ellipsoid to obclabate with a short stalk (Figs. 55, 56). Occasionally, the tetrasporic ramuli show the slight constriction at their middle parts.

Collections examined: LYP 509, Hengwon, Cheju, 1987-XX-5 (leg. K.J. Lee). LYP 548, Hengwon, Cheju, 1987-[X-16 (leg. K.J. Lee).

The plants at hand agree well with the description and illustration given by Okamura (1934). Okamura (1934) described some plants having soft and twisted erect filaments. However, the plants of Cheju Island are rather rigid and spread their branches on the same plane. In this point of view, the plants of Cheju Island may be a distinct taxon from G. vagum.

Okamura (1934) indicated that the distribution of rhizoidal filaments of $G$. vagum was similar to Pterocladia plants, but the former differed from the latter in having more congestion of rhizoidal filaments at the outer part than at the central part of medulla. On the other hand, Sohn and Kang (1978) mentioned that the outermost cortical cells of $G$. vagum showed a similar form to those of Pterocladia species.

## Discussion

Dixon (1961) concluded that a"polysiphonia type" of life history might occur in a British species of Gelidium, although some irregularities were detected. Santelices (1974) said that the distribution of rhizoidal filaments, the cystocarpic structure and the external morphology of thallus constituted the most important and most discussed generic characters. Akatsuka (1979) suggested that the shape of cortical cells in surface-, end-, or side-view would be useful to delineate Gelidium and Pterocladia species. However, this suggestion needs more examination with variety of taxa to confirm whether the character would be species specific or not. Sohn and Kang (1978) found the cortical cells of G. vagum similar in morphology to Pterocladia species.
G. corneum var. pinnatum has been known as the same taxon as Pterocladia capilacea. The plants of G. comeum var. pinnatum collected in Cheju Island agreed well with Kuetzing's illustration of the taxon and also showed an external morphology similar to Pterocladia robusta (Taylor 1945). On the other hand, the rhizoidal filaments of the plants from Cheju Island are congested at the outer medullary layers, which is known to be characteristic in Gelidium species.

Both tetrasporangial and cystocarpic phases of G. amansii and Both sterile and cystocarpic phases of G. sesquipedale were regarded to occur in Cheju Island. Such thought of the occurrance of the two phases of a single species, G. amansii, or G. sesquipedale, was drawn by the similarity of the external
morphology and enternal structere of a thallus. Dixon and Irvine (1977) said that one could do little more than compare external form and internal structure when faced with a bewildering assemblage of sterile or tetrasporangial specimens. Although Sohn and Kang (1978) regarded that the arrangement and form of cystocarpic ramuli might be same as that of tetrasporic ramuli, there was no valuable clue to confirm the two phases in a single species. Thus, it is hard to discern with conviction the tetrasporangial and cystocarpic phases of a single species because no critically useful character was detected to date.

The branching mode, the shape of ultimate branchlets, the position of cystocarps or tetrasporangial sori, the outlines of erect filaments represented by cross section, the shape of cortical cells in end- or side-view and the distribution of rhizoidal filaments were employed to discern the taxa of Gelidium in Cheju Island. The shape of ultimate branchlets and the outlines of erect filaments were more useful to delineate species than others.

적 요

제주도산 우뭇가사리 가의 분류학적 연구의 일환으로 우뭇가사리속 수종 즉, 우뭇가사리, 가시우 뭇가사리, 깃우뭇가사리, 애기우뭇가사리, 실우뭇가사리, 그리고 막우뭇가사리에 대한 형태분류 학적인 특징을 조사하였다. 엽상체의 형태, 사분포자낭이나 낭과가 있는 가지의 형태, 피층세포의 형태, 단면으로 본 직립사의 겉모양, 그리고 근양사의 분포둥의 톡징이 제 주도산 우뭇가사리류를 분류하는데 주로 적용되었다. 이들 특징 중에서 사분포자낭이나 낭과가 있는 가지의 형태와 단면으 로 본 직립사의 겉모양이 종 식별에 보다 直가적이었지만 한국산 우뭇가사리과의 속 및 종분류에 뚜렷한 진단형질을 찾아내기 위하여 더많은 연구가 이루어져야 한다.

## Key to the species of Cheju Island

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1. Plants large, more than 50 mm ..... 3
2. Erect filaments cylindrical G. divaricatum
3. Erect filaments foliaceous G. pusillum
4. Lower parts of erect filaments double-edged G. sesquipedale
5. Lower parts of erect filaments cylindrical ..... 4
6. Round in end-view of the upper part and linear of the middle part G. vagum
7. Ellipsoid in end-view of the upper to middle part of erect filaments ..... 5
8. Apices of erect filaments acute ..... G. amansii
9. Apices of erect filaments obtuseG. corneum var. pinnatum

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